

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 1 and 19-20 have been amended. Support for these amendments can be found at least in original claim 2, which has been canceled without prejudice or disclaimer. New claims 21 and 22 have been added. No new matter is being added. Claims 1 and 3-22 are pending.

Allowable subject matter

Applicants appreciate the indication that claims 8-11, 13-15, 17 and 18 contain allowable subject matter.

Rejections under 35 U. S. C. §§ 102 and 103

Claims 1-4, 7, 12, 19, and 20 stand rejected under 35 U. S. C. § 102 (b) as being anticipated by U.S. Patent No. 6,263,667 to Sawada et al. ("Sawada"). Claim 5 stands rejected under 35 U. S. C. § 103(a) as being unpatentable over Sawada in view of U.S. Patent No. 6,763,656 to Bidner et al ("Bidner"). Claim 6 stands rejected under 35 U. S. C. § 103(a) as being unpatentable over Sawada in view of U.S. Patent No. 6,477,832 to Surnilla et al. ("Surnilla"). Claim 16 stands rejected under 35 U. S. C. § 103(a) as being unpatentable over Sawada and Bidner in view of U.S. Patent No. 5,524,433 to Adamezyk, Jr. et al. ("Adamezyk"). These rejections are respectfully traversed for at least the reasons given below.

Independent claim 1, as amended, recites:

an abnormality determining section that executes an abnormality determination of the NOx removing catalyst on the basis of output values of both of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section from a time at which the output value of the first exhaust gas atmosphere detecting section is varied to a first predetermined value to a time at which the output value of the second exhaust gas atmosphere detecting section reaches a second predetermined value when the exhaust gas atmosphere varying section increases the ratio between the

reducing agent and the oxidizing agent in the exhaust gas, wherein the abnormality determining section calculates an integration quantity with respect to time of a difference between the output values of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section and executes the abnormality determination of the NOx removing catalyst on the basis of the calculated integration quantity of the difference.

Thus, in claim 1, the abnormality determination of the NOx removing catalyst is executed on the basis of a calculated integration quantity with respect to time of a difference between the output value of the first exhaust atmosphere detecting section (upstream of the NOx removing catalyst) and the output value of the second exhaust atmosphere detecting section (downstream of the NOx removing catalyst) during an interval of time when the exhaust gas atmosphere varying section increases the ratio between the reducing agent and the oxidizing agent in the exhaust gas, i.e., during rich spike control. Sawada fails to disclose at least this feature of claim 1.

Sawada does not disclose executing the abnormality determination of a NOx removing catalyst on the basis of a calculated integration quantity with respect to time of a difference between the output value of the first exhaust atmosphere detecting section (upstream of the NOx removing catalyst) and the output value of the second exhaust atmosphere detecting section (downstream of the NOx removing catalyst) during rich spike control. The Office Action cites to Sawada at step 725 for disclosing this feature, which was incorporated from claim 2. Step 725 of Sawada, however, merely discloses that TSTR may be corrected based on a temperature correction factor KTCAT, and a flow rate correction factor KGA. In particular Sawada discloses in step 725 that CATDOR is equal to the product of TSTR and the coefficients KTCAT and KGA. The product of coefficients KTCAT and KGA, however, are not the difference between the output value of an upstream atmosphere detecting section and downstream atmosphere detecting section. Thus, the product of TSTR and the coefficients KTCAT and KGA cannot be an integration quantity with respect to time of a difference between the output value of the first exhaust atmosphere detecting section (upstream of the NOx removing catalyst) and the output value of the second exhaust atmosphere detecting section (downstream of the NOx removing catalyst). Sawada fails to disclose all the features of claim 1 for at least this reason.

The Advisory Action states on page 2:

As shown in Figure 7, Sawada et al. calculate (in step 725) an integration quantity (CATDOR) with respect to time of a difference (TSTR) between the output values (RICH versus STOICHIOMETRIC) of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section. The time difference (TSTR) is an integration quantity that sums up the time it takes for the second (or downstream) sensor (33) to switch from STOICHIOMETRIC value to RICH value. Because of this, the quantity (CATDOR), which is proportional to TSTR, is also an integration quantity with respect to time.

The quantity CATDOR, however, is not the integration quantity as specifically recited in claim 1. CATDOR is equal to the product of TSTR and the product of the coefficients KTCAT and KGA. Even if the value TSTR is a time integration, the product of TSTR and the coefficients KTCAT and KGA is not an integration quantity with respect to time of a difference between the output value of an upstream exhaust atmosphere detecting section and the output value of a downstream exhaust atmosphere detecting section. KTCAT and KGA are merely coefficients, and their product is not a difference between the output value of an upstream exhaust atmosphere detecting section and the output value of a downstream exhaust atmosphere detecting section. Thus, even if TSTR could be considered to be an integrated time value, the product of (KTCAT x KGA) and TSTR can not be an integration quantity with respect to time of a difference between output values of an upstream and downstream sensor. Even if CATDOR is proportional to TSTR, that does not make it an integration quantity as recited in claim 1, at least because the quantity (KTCAT x KGA) is not a difference between output values of an upstream and downstream sensor.

Moreover, the use of the calculated integration quantity as in claim 1 in catalyst abnormality determination provides advantages not realized by Sawada. Paragraph [0070] of the present specification, discloses the use of calculated integration quantities in catalyst abnormality determination, where the influences of control error and control deviations given to rich spike control are eliminated and a stable abnormality determination is possible with high accuracy. Sawada failing to disclose the use of calculated integration quantities as recited in claim 1 in catalyst abnormality determination, fails to realize the advantages resulting therefrom.

Bidner, Surnilla and Adamezyk were cited for other features of the claims, but fail to cure the deficiencies of Sawada.

Independent claims 19 and 20 respectively recite “abnormality determining means for executing an abnormality determination of the NOx removing catalyst means on the basis of output values of both of the first exhaust gas atmosphere detecting means and the second exhaust gas atmosphere detecting means from a time at which the output value of the first exhaust gas atmosphere detecting means is varied to a first predetermined value to a time at which the output value of the second exhaust gas atmosphere detecting means reaches a second predetermined value when the exhaust gas atmosphere varying means increases the ratio between the reducing agent and the oxidizing agent in the exhaust gas, wherein the abnormality determining means calculates an integration quantity with respect to time of a difference between the output values of the first exhaust gas atmosphere detecting means and the second exhaust gas atmosphere detecting means and executes the abnormality determination of the NOx removing catalyst on the basis of the calculated integration quantity of the difference” and “executing an abnormality determination of the NOx removing catalyst on the basis of output values of both of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section from a time at which the output value of the first exhaust gas atmosphere detecting section is varied to a first predetermined value to a time at which the output value of the second exhaust gas atmosphere detecting section reaches a second predetermined value when the exhaust gas atmosphere varying section increases the ratio between the reducing agent and the oxidizing agent in the exhaust gas; calculating an integration quantity with respect to time of a difference between the output values of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section; and executing the abnormality determination of the NOx removing catalyst on the basis of the calculated integration quantity of the difference”, and thus are patentable for reasons analogous to claim 1.

New claims 21 and 22 recite “wherein the abnormality determining section calculates an integration quantity of a difference between the output values of the first and second exhaust gas atmosphere detecting sections and executes the abnormality determination of the NOx removing catalyst on the basis of the calculated integration quantity of the difference”

and “wherein the abnormality determining section calculates an integration quantity with respect to time on the basis of a previous integration quantity with respect to time thereof and a difference between the output values of the first and second exhaust gas atmosphere detecting sections and executes the abnormality determination of the NOx removing catalyst on the basis of the calculated integration quantity of the difference”, and are likewise patentable for reasons analogous to claim 1.

The dependent claims depend from claim 1, either directly or indirectly, and are patentable for at least the same reasons, as well as for further patentable features recited therein.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date February 22, 2007

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